CLAIMS

I claim:

1. A method for transmitting and receiving data between terminal devices on a network, comprising the steps of:

dividing a data file of original data to be transmitted into clusters each having k blocks of data;

generating t+s blocks of parity data for a cluster by encoding s blocks of convolution data and k blocks of original data;

generating k+t blocks of transmission data using the k blocks of original data and t blocks selected from the parity data; and

transmitting the transmission data to another terminal on the network.

2. The method according to claim 1, wherein the convolution data for a first cluster is generated using data from a second cluster.

3. The method according to claim 1, wherein transmission data is generated by adding, to the original data of the cluster, t' blocks of data from the t+s blocks of parity data, where t'>t .

4. A method for transmitting and receiving data between terminal devices on a network, comprising the steps of:

dividing a data file of original data to be transmitted into clusters;

generating parity data for a first cluster by encoding original data of the first cluster using information from a second cluster;

generating transmission data by adding the parity data to the original data; and

transmitting the transmission data to another terminal on the network.

5. The method according to claim 4, wherein the parity data is generated by encoding the original data using data selected from parity data of the second cluster.

6. The method according to claim 4, wherein at least part of the parity data of the first cluster is added to original data of the second cluster when original data of the second cluster is encoded.

7. A method for transmitting and receiving data between terminals on a network, comprising the steps of:

receiving a data string including original data divided into clusters and parity data;

if data of a given cluster is lost during communication, decoding remaining data of the given cluster and restoring original data of the given cluster and convolution data used to generate parity data for the given cluster;

unless the number of blocks of data in the given cluster is sufficient to restore the original data and the convolution data, complementing and decoding data of the given cluster using restored data of another cluster, and restoring the original data and the convolution data; and

generating a data file by concatenating the original data of the clusters.

8. The method according to claim 7, wherein, unless the number of received blocks of data of the given cluster is sufficient to restore the original data and the convolution data, data of the given cluster is complemented using data acquired by encoding original data and convolution data restored in a cluster immediately before or immediately after the given cluster.

9. A communication system for exchanging data between terminal devices via a network, comprising:

a transmitting terminal device that divides a data file of original data into clusters,

generates parity data for a cluster by encoding data in the cluster using data in a second cluster, and transmits, over a network, transmission data generated by adding the parity data to original data of the cluster; and

a receiving terminal device that receives the transmission data transmitted by the transmitting terminal device and restores the original data for the cluster if part of the transmission data is lost during communication.

10. The communication system according to claim 9, wherein, unless the number of blocks of received transmission data of the cluster is sufficient to restore original data lost during communication, the receiving terminal device complements the cluster using restored data of the second cluster and restores the original data of the cluster.

11. A data transmitting device for transmitting data via a network, comprising:

a file storage unit for storing a data file of original data;

a transmission data generation unit for reading original data from the file storage unit, dividing the read original data into clusters, generating parity data for a cluster by encoding original data of the cluster using data of a second cluster, and generating transmission data including the parity data and the original data; and

a transmission control unit for transmitting the transmission data generated by the transmission data generation unit.

12. The data transmitting device according to claim 11, wherein the transmission data generation unit uses parity data of a cluster immediately before the cluster when encoding original data of the cluster.

13. A data receiving device for receiving data transmitted via a network, comprising:

a reception control unit for receiving a data string including original data divided into clusters and parity data;

a data restoring unit which, if any data is lost in a cluster during communication,

decodes remaining data in the cluster and restores the original data and convolution data used for generating parity data for the original data, and which, unless the number of blocks of data received is sufficient to restore the original data and the convolution data, complements and decodes the cluster using restored data of a second cluster to restore the original data and the convolution data; and

a file storage unit for storing a data file obtained by concatenating the received or restored original data.

14. The data receiving device according to claim 13, wherein, unless the number of received blocks of data of the cluster is sufficient to restore the original data and the convolution data, the data restoring unit complements the given cluster using data acquired by encoding the original data and convolution data restored in the cluster immediately before the cluster or convolution data restored in the cluster immediately after the cluster.

15. A program product for transmitting data by controlling a computer connected to a network to enable the computer to execute method steps comprising:

dividing a data file of original data to be transmitted into clusters each of which has k blocks of data;

generating t+s blocks of parity data for a cluster by encoding the k blocks of original data of the cluster using s blocks of convolution data;

generating k+t blocks of transmission data by adding t blocks selected from the parity data to the original data of the cluster; and

transmitting the transmission data via the network.

16. The program product according to claim 15, wherein the s blocks of convolution data for the cluster are selected from parity data of a second cluster immediately before the cluster.

17. A program product for receiving data transmitted via a network by controlling a computer connected to the network to enable the computer to execute method steps comprising:

receiving a data string including original data divided into clusters and parity data;

decoding remaining data in a cluster and restoring original data of the cluster and convolution data used to generate parity data for the given if any data of the cluster is lost during communication;

complementing and decoding data of the cluster using restored data of a second cluster and restoring the original data and the convolution data unless the number of blocks of received data is sufficient to restore the original data and the convolution data; and

generating a data file by concatenating the original data of the received or restored clusters.

18. The program product according to claim 17, wherein the cluster is complemented using data acquired by encoding the original data using convolution data restored in a second cluster immediately before the cluster or using convolution data restored in a third cluster immediately after the cluster.